

1 What is claimed is:

2 1. An optical device comprising:

3 a conductive film having first and second surfaces;

4 at least one aperture provided in said conductive film and extending from said first

5 surface to said second surface; and

6 a surface topography formed on at least one of said first and second surfaces,

7 wherein said surface topography increases an intensity of light incident onto one of said

8 first and second surfaces and transmitted through said aperture;

9 wherein a region on which said surface topography is formed is larger than a region

10 where said light is incident on said conductive film surface, and

11 wherein said aperture is formed on said region on which said surface topography is

12 formed.

13 2. The optical device according to claim 1,

14 wherein said surface topography is formed in the shape of concentric circles.

15 3. The optical device according to claim 1,

16 wherein the diameter of said aperture is smaller than the wavelength of said incident

17 light.

18 4. An optical module comprising:

19 an optical device including a conductive film having first and second surfaces, at

20 least one aperture provided in said conductive film and extending from said first surface to

21 said second surface, and a surface topography formed on at least one of said first and

22 second surfaces, wherein said surface topography increases an intensity of light incident

23 onto one of said first and second surfaces and transmitted through said aperture;

24 wherein the center of light flux of light incident on said conductive film is deviated

25 from the center of said aperture.

- 1     5.     The optical module comprising optical device according to claim 4,  
2           wherein a displacement between the center of light flux of light incident on said  
3     conductive film and the center of said aperture is  $1/2$  or less of the diameter of said light  
4     flux.
- 5     6.     The optical module according to claim 4,  
6           wherein the light flux of light incident on said optical device is formed so as to  
7     include at least said aperture.
- 8     7.     The optical module according to claim 4,  
9           wherein a displacement between the center of said aperture and the center of said  
10    surface topography is  $1/4$  or less of a period of said surface topography.
- 11    8.     An optical module comprising:  
12           an optical device including a conductive film having first and second surfaces, at  
13    least one aperture provided in said conductive film and extending from said first surface to  
14    said second surface, and a surface topography formed on at least one of said first and  
15    second surfaces, wherein said surface topography increases an intensity of light incident  
16    onto one of said a first and second surfaces and transmitted through said aperture; and  
17           a means for varying an angle of a polarization surface of light incident on said  
18    optical device.
- 19    9.     The optical module according to claim 8,  
20           wherein said angle is adjusted by varying an angle that brings a direction of said  
21    polarization into coincidence with a direction connecting between the center of said light  
22    flux and the center of said aperture.
- 23    10.    The optical module according to claim 8,  
24           wherein the center of light flux of light incident on said conductive film is deviated  
25    from the center of said aperture.

1 11. The optical module according to claim 10,  
2 wherein a displacement between the center of light flux of light incident on said  
3 conductive film and the center of said aperture is  $1/2$  or less of the diameter of said light  
4 flux.

5 12. The optical module according to claim 10,  
6 wherein a displacement between the center of said aperture and the center of said  
7 surface topography is  $1/4$  or less of a period of said surface topography.

8 13. An optical head for recording and/or reproducing information on an optical  
9 recording medium comprising:  
10 a slider adjacent and facing to said optical recording medium;  
11 an optical device formed on a surface of said slider facing to said optical recording  
12 medium, including a conductive film having first and second surfaces, at least one aperture  
13 provided in said conductive film and extending from said first surface to said second  
14 surface, a surface topography formed on at least one of said first and second surfaces,  
15 wherein said surface topography increases an intensity of light incident onto one of said  
16 surfaces and transmitted through said aperture;  
17 wherein the center of light flux of light incident on said conductive film is deviated  
18 from the center of said aperture.

19 14. The optical head according to claim 13,  
20 wherein a displacement between the center of light flux of light incident on said  
21 conductive film and the center of said aperture is  $1/2$  or less of the diameter of said light  
22 flux.

23 15. The optical head according to claim 13,  
24 wherein the light flux of light incident on said optical device is formed so as to  
25 include at least said aperture.

1 16. The optical head according to claim 13,

2 wherein said displacement between the center of said aperture and the center of  
3 said surface topography is  $1/4$  or less of a period of said surface topography.

4 17. The optical head according to claim 13,

5 further comprising an optical fiber for transmitting light from a light source; and  
6 a light-collecting optical system for collecting light emitted from an optical fiber to  
7 said optical device.

8 18. The optical head according to claim 17,

9 wherein said light-collecting optical system comprises a lens for collimating light  
10 outputted from said optical fiber and a light-collecting lens for directing said collimated  
11 light to said optical device.

12 19. An optical head for recording and/or reproducing information on an optical  
13 recording medium comprising:

14 a slider adjacent and facing to said optical recording medium;

15 an optical device formed on a surface of said slider facing to said optical recording  
16 medium, including a conductive film having first and second surfaces, at least one aperture  
17 provided in said conductive film and extending from said first surface to said second  
18 surface, a surface topography formed on at least one of said first and second surfaces,  
19 wherein said surface topography increases an intensity of light incident onto one of said  
20 surfaces and transmitted through said aperture; and

21 a means for varying an angle of a polarization surface of light incident on said  
22 optical device.

23 20. The optical head according to claim 19,

24 wherein the center of light flux of light incident on said conductive film is deviated  
25 from the center of said aperture.

- 1    21.    The optical head according to claim 19,  
2            wherein a displacement between the center of light flux of light incident on said  
3    conductive film and the center of said aperture is  $1/2$  or less of the diameter of said light  
4    flux.
- 5    22.    The optical head according to claim 19,  
6            wherein a displacement between the center of said aperture and the center of said  
7    surface topography is  $1/4$  or less of a period of said surface topography.
- 8    23.    The optical head according to claim 19,  
9            wherein said angle is adjusted by varying an angle that brings a direction of said  
10    polarization into coincidence with a direction connecting between the center of said light  
11    flux and the center of said aperture.
- 12    24.    An optical recording/reproducing apparatus for recording/reproducing information  
13    on an optical recording medium comprising:  
14            an optical head according to claim 13;  
15    wherein said optical head reproduces information recorded on said optical recording  
16    medium according to light reflected from said optical recording medium.
- 17    25.    The optical recording/reproducing apparatus for recording/reproducing information  
18    on an optical recording medium comprising:  
19            an optical head according to claim 19;  
20    wherein said optical head reproduces information recorded on said optical recording  
21    medium according to light reflected from said optical recording medium.
- 22    26.    The optical recording/reproducing apparatus comprising:  
23            an optical recording medium recording information using light from a light source;  
24            a recording optical head comprising:  
25                  a slider adjacent and facing to said optical recording medium;

1                    an optical device formed on a surface of said slider facing to said optical  
2    recording medium, including a conductive film having first and second surfaces, at least  
3    one aperture provided in said conductive film and extending from said first surface to said  
4    second surface, a surface  
5    topography formed on at least one of said first and second surfaces, wherein said surface  
6    topography increases an intensity of light incident onto one of said surfaces and transmitted  
7    through said aperture,  
8                    wherein the center of light flux of light incident on said conductive film is  
9    deviated from the center of said aperture; and  
10                  a reproducing optical head for receiving and reproducing transmitted light passing  
11    through said optical recording medium.  
12    27.    The optical recording/reproducing apparatus comprising:  
13    an optical recording medium recording information using light from a light source;  
14                  a recording optical head comprising:  
15                          a slider adjacent and facing to said optical recording medium,  
16                          an optical device formed on a surface of said slider facing to said optical  
17    recording medium, including a conductive film having first and second surfaces, at least  
18    one aperture provided in said conductive film and extending from said first surface to said  
19    second surface, a surface topography formed on at least one of said first and second  
20    surfaces, wherein said surface topography increases an intensity of light incident onto one  
21    of said surfaces and transmitted through said aperture,  
22                          a means for varying an angle of a polarization surface of light incident on  
23    said optical device; and  
24                  a reproducing optical head for receiving and reproducing transmitted light passing  
25    through said optical recording medium.

1  
2 28. An optical recording/reproducing apparatus for recording/reproducing information  
3 on a magneto-optical recording medium comprising:  
4 a recording optical head comprising:  
5 a slider adjacent and facing to said optical recording medium,  
6 an optical device formed on a surface of said slider facing to said optical  
7 recording medium, including a conductive film having first and second surfaces, at least  
8 one aperture provided in said conductive film and extending from said first surface to said  
9 second surface, a surface topography formed on at least one of said first and second  
10 surfaces, wherein said surface topography increases an intensity of light incident onto one  
11 of said surfaces and transmitted through said aperture,  
12 wherein the center of light flux of light incident on said conductive film is  
13 deviated from the center of said aperture; and  
14 a reproducing head detecting detects a leaked magnetic flux of said magneto-optical  
15 recording medium according to a magneto-resistance effect.  
16 29. An optical recording/reproducing apparatus for recording/reproducing information  
17 on a magneto-optical recording medium comprising:  
18 a recording optical head comprising:  
19 a slider adjacent and facing to said optical recording medium,  
20 an optical device formed on a surface of said slider facing to said optical  
21 recording medium, including a conductive film having first and second surfaces, at least  
22 one aperture provided in said conductive film and extending from said first surface to said  
23 second surface, a surface topography formed on at least one of said first and second  
24 surfaces, wherein said surface topography increases an intensity of light incident onto one  
25 of said surfaces and transmitted through said aperture,

- 1                    a means for varying an angle of a polarization surface of light incident on
- 2    said optical device; and
- 3                    a reproducing head detecting detects a leaked magnetic flux of said magneto-optical
- 4    recording medium according to a magneto-resistance effect.